

A8  
cont. 1 2. (Amended) The device of claim 1, wherein the first single-piece housing portion  
2 provides the top surface, the side surface and a peripheral portion of the bottom surface, and the  
3 second single-piece housing portion provides a central portion of the bottom surface within the  
4 peripheral portion of the bottom surface.

1 3. (Amended) The device of claim 1, wherein the first single-piece housing portion  
2 contacts the lower surface.

1 4. (Amended) The device of claim 1, wherein the insulative housing consists of the first  
2 and second single-piece housing portions.

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A9 1 11. (Amended) A semiconductor package device, comprising:  
2 an insulative housing with a top surface, a bottom surface, and a peripheral side surface  
3 between the top and bottom surfaces, wherein the insulative housing consists of a first single-  
4 piece housing portion and a second single-piece housing portion;  
5 a semiconductor chip within and surrounded by the insulative housing, wherein the chip  
6 includes an upper surface and a lower surface, the upper surface includes a conductive pad, the  
7 upper surface faces towards the bottom surface and faces away from the top surface, and the  
8 insulative housing contacts the lower surface;  
9 a terminal that protrudes downwardly from and extends through the bottom surface and is  
10 spaced from the side surface and is electrically connected to the pad; and  
11 a lead that protrudes laterally from and extends through the side surface and is electrically  
12 connected to the pad, wherein the first single-piece housing portion contacts the lower surface  
13 and the lead and is spaced from the terminal, the second single-piece housing portion contacts the  
14 first single-piece housing portion and the terminal, the terminal and the lead are spaced and  
15 separated from one another outside the insulative housing, and the terminal and the lead are  
16 electrically connected to one another inside the insulative housing and outside the chip.

1 12. (Amended) The device of claim 11, wherein the first single-piece housing portion is  
2 farther from the top surface than the lower surface is from the top surface.

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cont. 1 13. (Amended) The device of claim 11, wherein the first single-piece housing portion  
2 provides the top surface, the side surface and a peripheral portion of the bottom surface, and the  
3 second single-piece housing portion provides a central portion of the bottom surface within the  
4 peripheral portion of the bottom surface.

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A10 1 15. (Amended) The device of claim 11, wherein the first single-piece housing portion is  
2 a transfer molded material, and the second single-piece housing portion is not a transfer molded  
3 material.

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1 16. (Amended) The device of claim 11, wherein the second single-piece housing portion  
2 includes first and second opposing surfaces, the first surface contacts the lead and the second  
3 surface provides a portion of the bottom surface.

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A11 1 31. (Amended) A semiconductor package device, comprising:  
2 an insulative housing with a top surface, a bottom surface, and four peripheral side  
3 surfaces between the top and bottom surfaces, wherein the bottom surface includes a peripheral  
4 portion shaped as a rectangular peripheral ledge adjacent to the side surfaces and a recessed  
5 central portion within the peripheral portion and spaced from the side surfaces, and the peripheral  
6 portion protrudes downwardly from the central portion and extends a first distance below the  
7 central portion;  
8 a semiconductor chip within and surrounded by the insulative housing, wherein the chip  
9 includes an upper surface and a lower surface, the upper surface includes a conductive pad, the  
10 upper surface faces towards the bottom surface and faces away from the top surface, and the  
11 insulative housing contacts the lower surface;  
12 a terminal that protrudes downwardly from and extends through the central portion of the  
13 bottom surface and is spaced from the side surfaces and is electrically connected to the pad,  
14 wherein the terminal extends a second distance below the central portion, and the first distance is  
15 greater than the second distance; and

A11 16 a lead that protrudes laterally from and extends through one of the side surfaces and is  
17 electrically connected to the pad, wherein the terminal and the lead are spaced and separated  
18 from one another outside the insulative housing, and the terminal and the lead are electrically  
19 connected to one another inside the insulative housing and outside the chip.

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1 41. (Amended) A semiconductor package device, comprising:  
2 an insulative housing with a top surface, a bottom surface, and a peripheral side surface  
3 between the top and bottom surfaces;  
A12 4 a semiconductor chip within the insulative housing, wherein the chip includes an upper  
5 surface and a lower surface, and the upper surface includes a conductive pad;  
6 a terminal that protrudes downwardly from and extends through the bottom surface and is  
7 electrically connected to the pad; and  
8 a lead that protrudes laterally from and extends through the side surface and is electrically  
9 connected to the pad, wherein the lead includes a recessed portion that contacts and extends into  
10 the insulative housing and is spaced from the top and bottom surfaces and does not overlap the  
11 chip and a non-recessed portion that contacts and extends outside the insulative housing and is  
12 adjacent to the recessed portion and the bottom surface, the terminal and the lead are spaced and  
13 separated from one another outside the insulative housing, and the terminal and the lead are  
14 electrically connected to one another inside the insulative housing and outside the chip.

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1 51. (Amended) A semiconductor package device, comprising:  
2 an insulative housing with a top surface, a bottom surface, and a peripheral side surface  
3 between the top and bottom surfaces;  
A13 4 a semiconductor chip within and surrounded by the insulative housing, wherein the chip  
5 includes an upper surface and a lower surface, the upper surface includes a conductive pad, the  
6 upper surface faces towards the bottom surface and faces away from the top surface, and the  
7 insulative housing contacts the lower surface;  
8 a terminal that protrudes downwardly from and extends through the bottom surface and is  
9 spaced from the side surface and is electrically connected to the pad; and

AB 10 a lead that protrudes laterally from and extends through the side surface and is electrically  
11 connected to the pad, wherein the lead includes a recessed portion that contacts and extends into  
12 the insulative housing and is spaced from the top and bottom surfaces and does not overlap the  
13 chip and a non-recessed portion that contacts and extends outside the insulative housing and is  
14 adjacent to the recessed portion and the bottom surface, the terminal and the lead are spaced and  
15 separated from one another outside the insulative housing, and the terminal and the lead are  
16 electrically connected to one another inside the insulative housing and outside the chip.

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Add the following claims:

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1           61.     A semiconductor package device, comprising:

2           an insulative housing with a top surface, a bottom surface, and a peripheral side surface  
3           between the top and bottom surfaces;

4           a semiconductor chip within the insulative housing, wherein the chip includes an upper  
A14 5           surface and a lower surface, and the upper surface includes a conductive pad;

6           a routing line within the insulative housing that overlaps and is electrically connected to  
7           the pad;

8           a terminal that protrudes downwardly from and is integral with the routing line, protrudes  
9           downwardly from and extends through the bottom surface and is electrically connected to the  
10          pad; and

11          a lead that protrudes downwardly from and contacts and is not integral with the routing  
12          line, protrudes laterally from and extends through the side surface and is electrically connected to  
13          the pad, wherein the terminal and the lead are spaced and separated from one another outside the  
14          insulative housing, and the terminal and the lead are electrically connected to one another by the  
15          routing line inside the insulative housing and outside the chip.

1           62.     The device of claim 61, wherein the insulative housing includes a first single-

2           piece housing portion that contacts the routing line and the lead and is spaced from the terminal

3           and a second single-piece housing portion that contacts the first single-piece housing portion, the

4           routing line and the terminal.

1           63.     The device of claim 62, wherein the first single-piece housing portion contacts the

2           lower surface.

1           64.     The device of claim 62, wherein the insulative housing consists of the first and

2           second single-piece housing portions.

1           65.    The device of claim 61, wherein the terminal is the only electrical conductor that  
2 extends through the top or bottom surfaces and is electrically connected to the pad.

1           66.    The device of claim 61, wherein the routing line and the terminal are a plated  
2 metal.

1           67.    The device of claim 61, wherein the terminal is within a periphery of the chip, the  
2 routing line is within and outside the periphery of the chip, and the lead is outside the periphery  
3 of the chip.

1           68.    The device of claim 61, wherein the device is devoid of an electrical conductor  
2 that extends through the top surface and is electrically connected to the pad.

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cont.  
1           69.    The device of claim 61, wherein the device includes a plurality of terminals and  
2 leads, the chip includes a plurality of pads, each of the terminals are electrically connected to one  
3 of the leads and one of the pads inside the insulative housing and outside the chip, the terminals  
4 are arranged as an array that protrudes downwardly from and extends through the bottom surface,  
5 and the leads are arranged as TSOP leads that protrude laterally from and extend through the side  
6 surface and an opposing peripheral side surface of the insulative housing.

1           70.    The device of claim 61, wherein the device is devoid of wire bonds, TAB leads  
2 and solder joints.

1           71.    A semiconductor package device, comprising:  
2           an insulative housing with a top surface, a bottom surface, and a peripheral side surface  
3 between the top and bottom surfaces;  
4           a semiconductor chip within and surrounded by the insulative housing, wherein the chip  
5 includes an upper surface and a lower surface, the upper surface includes a conductive pad, the  
6 upper surface faces towards the bottom surface and faces away from the top surface, and the  
7 insulative housing contacts the lower surface;

8 a routing line within and surrounded by the insulative housing, wherein the routing line  
9 overlaps and is electrically connected to the pad;

10 a terminal that protrudes downwardly from and is integral with the routing line, protrudes  
11 downwardly from and extends through the bottom surface, is spaced from the side surface and is  
12 electrically connected to the pad; and

13 a lead that protrudes downwardly from and contacts and is not integral with the routing  
14 line, protrudes laterally from and extends through the side surface and is electrically connected to  
15 the pad, wherein the terminal and the lead are spaced and separated from one another outside the  
16 insulative housing, and the terminal and the lead are electrically connected to one another inside  
17 the insulative housing and outside the chip.

A14  
cont.  
1 72. The device of claim 71, wherein the insulative housing consists of a first single-  
2 piece housing portion that contacts the lower surface, the routing line and the lead and is spaced  
3 from the terminal and a second single-piece housing portion that contacts the first single-piece  
4 housing portion, the routing line and the terminal.

1 73. The device of claim 72, wherein the first single-piece housing portion provides  
2 the top surface, the side surface and a peripheral portion of the bottom surface, and the second  
3 single-piece housing portion provides a central portion of the bottom surface within the  
4 peripheral portion of the bottom surface.

1 74. The device of claim 73, wherein the peripheral portion of the bottom surface is  
2 outside a periphery of the chip, and the central portion of the bottom surface is within and outside  
3 the periphery of the chip.

1 75. The device of claim 72, wherein the first single-piece housing portion is a transfer  
2 molded material, and the second single-piece housing portion is not a transfer molded material.

1           76.    The device of claim 72, wherein the second single-piece housing portion includes  
2 first and second opposing surfaces, the first surface contacts the routing line and the second  
3 surface provides a portion of the bottom surface.

1           77.    The device of claim 71, wherein the terminal is within a periphery of the chip and  
2 outside a periphery of the pad, the routing line is within and outside the periphery of the chip,  
3 and the lead is outside the periphery of the chip.

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Cont.  
1           78.    The device of claim 71, wherein the routing line is plated on the lead inside the  
2 insulative housing, outside a periphery of the terminal and outside a periphery of the chip.

1           79.    The device of claim 71, wherein the device includes a plurality of terminals and  
2 leads, the chip includes a plurality of pads, each of the terminals are electrically connected to one  
3 of the leads and one of the pads inside the insulative housing and outside the chip, the terminals  
4 are arranged as an array that protrudes downwardly from and extends through the bottom surface,  
5 and the leads are arranged as TSOP leads that protrude laterally from and extend through the side  
6 surface and an opposing peripheral side surface of the insulative housing.

1           80.    The device of claim 71, wherein the device is devoid of wire bonds, TAB leads  
2 and solder joints.

1           81.    A semiconductor package device, comprising:  
2           an insulative housing with a top surface, a bottom surface, and peripheral side surfaces  
3 between the top and bottom surfaces, wherein the bottom surface includes a peripheral portion  
4 adjacent to the side surfaces and a central portion within the peripheral portion and spaced from  
5 the side surfaces, and the peripheral portion protrudes downwardly from the central portion;  
6           a semiconductor chip within and surrounded by the insulative housing, wherein the chip  
7 includes an upper surface and a lower surface, and the upper surface includes a conductive pad;  
8           a routing line within and surrounded by the insulative housing, wherein the routing line  
9 overlaps and is electrically connected to the pad;



10 a terminal that protrudes downwardly from and is integral with the routing line, protrudes  
11 downwardly from and extends through the central portion of the bottom surface, is spaced from  
12 the side surfaces and is electrically connected to the pad; and

13 a lead that protrudes downwardly from and contacts and is not integral with the routing  
14 line, protrudes laterally from and extends through one of the side surfaces and is electrically  
15 connected to the pad, wherein the terminal and the lead are spaced and separated from one  
16 another outside the insulative housing, and the terminal and the lead are electrically connected to  
17 one another by the routing line inside the insulative housing and outside the chip.

A14  
CONT.  
1 82. The device of claim 81, wherein the insulative housing consists of a first single-  
2 piece housing portion that contacts the lower surface, the routing line and the lead and is spaced  
3 from the terminal and a second single-piece housing portion that contacts the first single-piece  
4 housing portion, the routing line and the terminal.

1 83. The device of claim 82, wherein the first single-piece housing portion provides  
2 the top surface, the side surfaces and the peripheral portion of the bottom surface, and the second  
3 single-piece housing portion provides the central portion of the bottom surface.

1 84. The device of claim 83, wherein the peripheral portion of the bottom surface is  
2 outside a periphery of the chip, and the central portion of the bottom surface is within and outside  
3 the periphery of the chip.

1 85. The device of claim 82, wherein the first single-piece housing portion is a transfer  
2 molded material, and the second single-piece housing portion is not a transfer molded material.

1 86. The device of claim 81, wherein the peripheral portion of the bottom surface  
2 protrudes a first distance below the central portion of the bottom surface, the terminal protrudes a  
3 second distance below the central portion of the bottom surface, and the first distance is greater  
4 than the second distance.

1           87.     The device of claim 81, wherein the peripheral portion of the bottom surface is  
2     shaped as a rectangular peripheral ledge.

1           88.     The device of claim 81, wherein the terminal is within a periphery of the chip, the  
2     routing line is within and outside the periphery of the chip, the lead is outside the periphery of  
3     the chip, and the peripheral portion of the bottom surface is outside the periphery of the chip.

A14  
cont.  
1           89.     The device of claim 81, wherein the device includes a plurality of terminals and  
2     leads, the chip includes a plurality of pads, each of the terminals are electrically connected to one  
3     of the leads and one of the pads inside the insulative housing and outside the chip, the terminals  
4     are arranged as an array that protrudes downwardly from and extends through the central portion  
5     of the bottom surface, and the leads are arranged as TSOP leads that protrude laterally from and  
6     extend through two of the side surfaces that oppose one another.

1           90.     The device of claim 81, wherein the device is devoid of wire bonds, TAB leads  
2     and solder joints.

1           91.     A semiconductor package device, comprising:  
2             an insulative housing with a top surface, a bottom surface, and four peripheral side  
3     surfaces between the top and bottom surfaces, wherein the bottom surface includes a peripheral  
4     portion shaped as a rectangular peripheral ledge adjacent to the side surfaces and a recessed  
5     central portion within the peripheral portion and spaced from the side surfaces, and the peripheral  
6     portion protrudes downwardly from the central portion and extends a first distance below the  
7     central portion;

8             a semiconductor chip within and surrounded by the insulative housing, wherein the chip  
9     includes an upper surface and a lower surface, the upper surface includes a conductive pad, the  
10    upper surface faces towards the bottom surface and faces away from the top surface, and the  
11    insulative housing contacts the lower surface;

12            a routing line within and surrounded by the insulative housing, wherein the routing line  
13    overlaps and is electrically connected to the pad;

14 a terminal that protrudes downwardly from and is integral with the routing line, protrudes  
15 downwardly from and extends through the central portion of the bottom surface, is spaced from  
16 the side surfaces and is electrically connected to the pad, wherein the terminal extends a second  
17 distance below the central portion, and the first distance is greater than the second distance; and  
18 a lead that protrudes downwardly from and contacts and is not integral with the routing  
19 line, protrudes laterally from and extends through one of the side surfaces and is electrically  
20 connected to the pad, wherein the terminal and the lead are spaced and separated from one  
21 another outside the insulative housing, and the terminal and the lead are electrically connected to  
22 one another by the routing line inside the insulative housing and outside the chip.

A14  
Cont.  
1 92. The device of claim 91, wherein the insulative housing consists of a first single-  
2 piece housing portion that contacts the lower surface, the routing line and the lead and is spaced  
3 from the terminal and a second single-piece housing portion that contacts the first single-piece  
4 housing portion, the routing line and the terminal.

1 93. The device of claim 92, wherein the first single-piece housing portion provides  
2 the top surface, the side surfaces and the peripheral portion of the bottom surface, and the second  
3 single-piece housing portion provides the central portion of the bottom surface.

1 94. The device of claim 93, wherein the peripheral portion of the bottom surface is  
2 outside a periphery of the chip, and the central portion of the bottom surface is within and outside  
3 the periphery of the chip.

1 95. The device of claim 92, wherein the first single-piece housing portion is a transfer  
2 molded material, and the second single-piece housing portion is not a transfer molded material.

1 96. The device of claim 91, wherein the first distance is about twice the second  
2 distance.

1 97. The device of claim 91, wherein the peripheral portion of the bottom surface is  
2 integral with the side surfaces and non-integral with the central portion of the bottom surface.

1 98. The device of claim 91, wherein the terminal is within a periphery of the chip, the  
2 routing line is within and outside the periphery of the chip, the lead is outside the periphery of  
3 the chip, and the peripheral portion of the bottom surface is outside the periphery of the chip.

1 99. The device of claim 91, wherein the device includes a plurality of terminals and  
2 leads, the chip includes a plurality of pads, each of the terminals are electrically connected to one  
3 of the leads and one of the pads inside the insulative housing and outside the chip, the terminals  
4 are arranged as an array that protrudes downwardly from and extends through the central portion  
5 of the bottom surface, and the leads are arranged as TSOP leads that protrude laterally from and  
6 extend through two of the side surfaces that oppose one another.

1 100. The device of claim 91, wherein the device is devoid of wire bonds, TAB leads  
2 and solder joints.

1 101. A semiconductor package device, comprising:  
2 an insulative housing with a top surface, a bottom surface, and a peripheral side surface  
3 between the top and bottom surfaces;  
4 a semiconductor chip within the insulative housing, wherein the chip includes an upper  
5 surface and a lower surface, and the upper surface includes a conductive pad;  
6 a terminal that protrudes downwardly from and extends through the bottom surface and is  
7 electrically connected to the pad; and  
8 a lead that protrudes laterally from and extends through the side surface and is electrically  
9 connected to the pad, wherein the lead includes a recessed portion that extends into the insulative  
10 housing and is spaced from the top and bottom surfaces and a non-recessed portion that extends  
11 outside the insulative housing and is adjacent to the recessed portion and contacts the insulative  
12 housing, the recessed and non-recessed portions each include four outer surfaces, three of the  
13 outer surfaces of the recessed and non-recessed portions that do not face in the same direction as

14 the bottom surface are coplanar with one another where the recessed and non-recessed portions  
15 are adjacent to one another, one of the outer surfaces of the recessed and non-recessed portions  
16 that face in the same direction as the bottom surface are not coplanar with one another where the  
17 recessed and non-recessed portions are adjacent to one another, the terminal and the lead are  
18 spaced and separated from one another outside the insulative housing, and the terminal and the  
19 lead are electrically connected to one another inside the insulative housing and outside the chip.

1 102. The device of claim 101, wherein the insulative housing includes a first single-  
2 piece housing portion that contacts the lead and is spaced from the terminal and a second single-  
3 piece housing portion that contacts the first single-piece housing portion and the terminal.

1 103. The device of claim 102, wherein the first single-piece housing portion contacts  
2 the lower surface.

1 104. The device of claim 102, wherein the insulative housing consists of the first and  
2 second single-piece housing portions.

1 105. The device of claim 101, wherein the terminal is the only electrical conductor that  
2 extends through the top or bottom surfaces and is electrically connected to the pad.

1 106. The device of claim 101, wherein the terminal is within a periphery of the chip,  
2 and the lead is outside the periphery of the chip.

1 107. The device of claim 101, wherein the terminal is integral with a planar routing  
2 line that overlaps the lead and the pad and contacts the lead inside the insulative housing, outside  
3 a periphery of the terminal and outside a periphery of the chip.

1 108. The device of claim 101, wherein the device is devoid of an electrical conductor  
2 that extends through the top surface and is electrically connected to the pad.

1 109. The device of claim 101, wherein the device includes a plurality of terminals and  
2 leads, the chip includes a plurality of pads, each of the terminals are electrically connected to one  
3 of the leads and one of the pads inside the insulative housing and outside the chip, the terminals  
4 are arranged as an array that protrudes downwardly from and extends through the bottom surface,  
5 and the leads are arranged as TSOP leads that protrude laterally from and extend through the side  
6 surface and an opposing peripheral side surface of the insulative housing.

1 110. The device of claim 101, wherein the device is devoid of wire bonds, TAB leads  
2 and solder joints.

114  
CONT.  
1 111. A semiconductor package device, comprising:  
2 an insulative housing with a top surface, a bottom surface, and a peripheral side surface  
3 between the top and bottom surfaces;  
4 a semiconductor chip within and surrounded by the insulative housing, wherein the chip  
5 includes an upper surface and a lower surface, the upper surface includes a conductive pad, the  
6 upper surface faces towards the bottom surface and faces away from the top surface, and the  
7 insulative housing contacts the lower surface;  
8 a terminal that protrudes downwardly from and extends through the bottom surface and is  
9 spaced from the side surface and is electrically connected to the pad; and  
10 a lead that protrudes laterally from and extends through the side surface and is electrically  
11 connected to the pad, wherein the lead includes a recessed portion that extends into the insulative  
12 housing and is spaced from the top and bottom surfaces and a non-recessed portion that extends  
13 outside the insulative housing and is adjacent to the recessed portion and contacts the insulative  
14 housing, the recessed and non-recessed portions each include four outer surfaces, three of the  
15 outer surfaces of the recessed and non-recessed portions that do not face in the same direction as  
16 the bottom surface are coplanar with one another where the recessed and non-recessed portions  
17 are adjacent to one another, one of the outer surfaces of the recessed and non-recessed portions  
18 that face in the same direction as the bottom surface are not coplanar with one another where the  
19 recessed and non-recessed portions are adjacent to one another, the terminal and the lead are

20 spaced and separated from one another outside the insulative housing, and the terminal and the  
21 lead are electrically connected to one another inside the insulative housing and outside the chip.

1 112. The device of claim 111, wherein the insulative housing consists of a first single-  
2 piece housing portion that contacts the lower surface and the lead and is spaced from the terminal  
3 and a second single-piece housing portion that contacts the first single-piece housing portion and  
4 the terminal.

A14  
Cont.

1 113. The device of claim 112, wherein the first single-piece housing portion provides  
2 the top surface, the side surface and a peripheral portion of the bottom surface, and the second  
3 single-piece housing portion provides a central portion of the bottom surface within the  
4 peripheral portion of the bottom surface.

1 114. The device of claim 113, wherein the peripheral portion of the bottom surface is  
2 outside a periphery of the chip, and the central portion of the bottom surface is within and outside  
3 the periphery of the chip.

1 115. The device of claim 112, wherein the first single-piece housing portion is a  
2 transfer molded material, and the second single-piece housing portion is not a transfer molded  
3 material.

1 116. The device of claim 112, wherein the second single-piece housing portion  
2 includes first and second opposing surfaces, the first surface contacts the lead and the second  
3 surface provides a portion of the bottom surface.

1 117. The device of claim 111, wherein the terminal is within a periphery of the chip  
2 and outside a periphery of the pad, and the lead is outside the periphery of the chip.

1           118. The device of claim 111, wherein the terminal is integral with a planar routing  
2 line that overlaps the lead and the pad and contacts the lead inside the insulative housing, outside  
3 a periphery of the terminal and outside a periphery of the chip.

1           119. The device of claim 111, wherein the device includes a plurality of terminals and  
2 leads, the chip includes a plurality of pads, each of the terminals are electrically connected to one  
3 of the leads and one of the pads inside the insulative housing and outside the chip, the terminals  
A14 4 are arranged as an array that protrudes downwardly from and extends through the bottom surface,  
5 and the leads are arranged as TSOP leads that protrude laterally from and extend through the side  
6 surface and an opposing peripheral side surface of the insulative housing.

1           120. The device of claim 111, wherein the device is devoid of wire bonds, TAB leads  
2 and solder joints.

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